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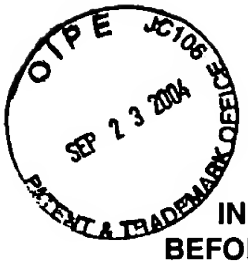

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of

Manoharprasad K. Rao

Group Art Unit: 3661

Serial No.: 09/683,779

Examiner: Tran, Dalena

Filed: 02/13/02

For: METHOD FOR OPERATING A PRE-CRASH SENSING SYSTEM IN A VEHICLE HAVING A COUNTERMEASURE SYSTEM USING A RADAR AND CAMERA

Attorney Docket No.: 201-0633 (FGT 1534 PA)

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BRIEF ON APPEAL

Mail Stop Appeal Brief – Patents
Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

Sir:

The following Appeal Brief is submitted pursuant to the Notice of Appeal filed on July 20, 2004, for the above-identified application.

I. Real Party in Interest

The real party in interest in this matter is Ford Global Technologies, LLC, which is a wholly owned subsidiary of Ford Motor Company both in Dearborn, Michigan (hereinafter "Ford").

II. Related Appeals and Interferences

There are no other known appeals or interferences which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of the Claims

Claims 1-23 stand rejected in the Final Office Action. A copy of the claims on appeal is attached as an Appendix.

IV. Status of Amendments Filed After Final

There have been no amendments filed subsequent to the final rejection.

V. Summary of the Invention

A high level system view of the system is illustrated in Figure 1. The details of Figure 1 are described in paragraphs 22-29. The decision zone 52 in front of the vehicle is illustrated in Figures 2-5 with details provided in paragraphs 30-33. Claim 1 is directed to a pre-crash system 10 for an automotive vehicle 50 having a radar 22 or lidar unit 24 that generates an object distance signal and an object relative velocity signal. Claim 1 also includes a decision zone 52. The decision zone is defined in the specification and may correspond to the width of the vehicle, and the length of the decision zone may correspond to the velocity of the vehicle. However, the decision zone is a specific area in front of the vehicle. The system also has a vision system 26 that generates an object size signal. The vision system 26 confirms the presence of the object within the decision zone 52. A controller 12 is coupled to the radar 22 or lidar unit 24 and the vision system 26. The controller 12 activates either the first countermeasure 40 or the first and the second countermeasure 40 in response to the object distance, relative velocity and the object size. Description of the countermeasures are set forth in paragraph 29.

Claim 6 is an independent claim. Claim 6 is less specific in terms of the sensors. Claim 6 includes a first sensor generating an object distance signal and relative velocity signal for an object present in a predefined decision zone 52 and a second sensor generating an object size signal. The second sensor confirms the presence of the object within the decision zone. Either a first countermeasure or the first and a second countermeasures are activated in response to said object distance, relative velocity and said object size.

Claim 10 is a method claim. Claim 10 includes a decision zone that is a function of the relative velocity of the vehicle. More specifically, claim 10 recites the steps of establishing a decision zone relative to the vehicle, detecting an object within the decision zone, determining an object distance and relative velocity, where the decision zone is a function of the relative velocity, determining an object size and activating the countermeasure system in response to the object size and relative velocity. Thus, the decision zone as illustrated has a width that is as wide as the vehicle but the length or distance from the vehicle of the decision zone may vary dependent on the relative velocity of the vehicle as described in paragraph 30 of the present application.

VI. Grounds of Rejection to be Reviewed on Appeal

The following issues are presented in this appeal:

Whether claims 1-3, 5-16 and 18-19 are obvious under 35 U.S.C. §103(a) over *Lemelson* (6,226,389).

Whether claim 4 is obvious under 35 U.S.C. §103(a) over *Lemelson* in view of *Kosiak* (5,835,007)

Whether claims 17 and 20 are obvious under 35 U.S.C. §103(a) as being unpatentable over *Lemelson* in view of *Farmer* (6,085,151)

VII. Argument

The Rejection of Claims 1-3, 5-16 and 18-19

Claim 1

In the Office Action, on page 2, the Examiner states, "Lemelson et al. discloses a pre-crash sensing system" that includes "a decision zone, and a vision system generating an object size signal, vision sensor confirming the presence of the object within the decision zone (see column 2, lines 44-55; column 7, lines-3049; and the abstract), a radar or lidar unit

generating an object distance signal and object relative velocity signal from an object within decision zone (see column 6, lines 5-13; and column 11, lines 35-57), and a controller coupled to the radar unit or lidar unit and vision system for activating either first countermeasure or the first and the second countermeasure in response to object distance, relative velocity and object size signals (see columns 2-3, lines 44-30)." The Examiner further states that, "It is obvious that in column 7, lines 40-49, Lemelson et al. discloses 'a CCD camera is used, the width can be ascertained... .' The relative velocities can also be easily calculated." The Examiner further states, "therefore, it is obvious that a decision zone has disclose in Lemelson et al. reference, and the scanning zone using a vision system." Appellant admits that Figure 1 of the *Lemelson* reference shows a radar, lidar or comp box 14 and a TV camera 16.

Appellant respectfully submits that the *Lemelson* reference does not teach or suggest a decision zone. Appellant has reviewed the sections of the *Lemelson* reference cited by the Examiner. For example, Col. 2, lines 44-55, Col. 7, lines 30-49, and Col. 6, lines 5-13, Col. 11, lines 35-57, and Cols. 2-3, lines 44-30. With respect to Col. 7, lines 40-47, the Examiner points to the fact that the camera can be used to ascertain a width. However, this section specifically refers to calculating the width of a scanned image such as an automobile or truck. This does not refer to a decision zone or the width of the decision zone. This paragraph also states that the first derivative or second derivative of the image width may be used to determine the vehicle speed (and acceleration). This also refers to the speed of the vehicle that is being imaged and not of a decision zone. That is, no teaching or suggestion is found in the *Lemelson* reference for a decision zone. Furthermore, although the *Lemelson* reference teaches radar and a camera, no teaching or suggestion is found for determining an object within a decision zone from a radar or lidar then confirming the presence of the object within the decision zone using a vision system. Although *Lemelson* specifically mentions the use of lidar or radar in addition to the camera signal on page 7, lines 46-49, Appellant can find no teaching or suggestion for confirming as set forth in claim 1.

In the Advisory Action the Examiner again points to Col. 7, lines 40-41, in which he states that, "the width can [be] ascertained, and lines 44-45, the relative velocities can [be] calculated." Also, "it is obvious Lemelson et al. disclose determining an object within a decision zone in column 7, lines 30-41." *Lemelson* does describe that the relative velocities may be determined but this is in reference to the changing width of the image pixels using the camera. Thus, as the pixeled width becomes larger, the speed of change may be correlated with a speed of change of the approaching vehicle. Appellant respectfully submits that the vision system described in the *Lemelson* reference does not generate an object distance signal and

object relative velocity signal then confirms the presence of the object within the decision zone using a vision system. Appellant therefore respectfully requests the Board to reverse the Examiner's position with respect to claim 1.

Claim 2

Claim 2 is dependent upon claim 1 and recites that the object size is height. This in combination with the recitations of claim 1 are not taught or suggested in the *Lemelson* reference. Appellant therefore respectfully requests the Board to reverse the Examiner's position with respect to claim 2.

Claim 3

Claim 3 is dependent upon claim 1 and recites that the object size comprises object area and object height. In the Final Office Action, on page 3, the Examiner states, "Lemelson et al. do not disclose object area and height." It is true that the *Lemelson* reference described shapes and sizes of various objects but does not specifically disclose the object area and the height of the object. It appears that the *Lemelson* reference is most concerned with the width of the object for setting forth the approaching speed as set forth in Col. 7, lines 30-59. Appellant therefore respectfully requests the Board to reverse the Examiner's position with respect to claim 3.

Claim 5

Claim 5 is dependent upon claim 1 and recites that the decision zone has a size dependent on the relative velocity signal. As mentioned above, Appellant respectfully believes that a decision zone is not taught or suggested in the *Lemelson* reference. Therefore, no decision zone that has a size dependent on the relative velocity signal is also not taught or suggested. Appellant therefore respectfully requests the Board to reverse the Examiner's position with respect to claim 5.

Claim 6

Claim 6 is an independent claim. Claim 6 is believed to be independently patentable. Claim 6 is broader than claim 1 in that the specific type of sensors are not set forth. Claim 6 also recites a second sensor that confirms the presence of the object within the decision zone. The arguments from claim 1 are applicable to claim 6. As mentioned above

with respect to claim 1, no teaching or suggestion is found in the *Lemelson* reference for a decision zone and confirming the presence of the object within the decision zone.

Claim 7

Claim 7 is dependent upon claim 6 and recites that the object size comprises height. This is similar to claim 2 and therefore claim is also believed to be allowable for the same reasons set forth above with respect to claim 2.

Claim 8

Claim 8 recites that the object size comprises object area and height. Claim 8 is believed to be independently patentable and allowable for the same reasons set forth above with respect to claim 3.

Claim 9

Claim 9 recites that the controller classifies the object and determines an object orientation in response to the object distance, object size and object type. The Examiner fails to allege that object orientation is taught or suggested in the *Lemelson* reference. Appellant therefore respectfully requests the Board to reverse the Examiner's rejection of claim 9.

Claim 10

Claim 10 is a method for operating a pre-crash sensing system. The pre-crash sensing system has a decision zone that is a function of the relative velocity. As mentioned above, no teaching or suggestion is provided in the *Lemelson* reference for a decision zone and that the decision zone is sized with respect to the relative velocity.

Claim 11

Claim 11 further recites that the step of determining object size comprises determining an object height and that activating a countermeasure is performed in response to the object type. As mentioned above with respect to claims 3 and 7 , this is not taught or suggested in the *Lemelson* reference. Appellant therefore respectfully request the Board to reverse the Examiner's position with respect to claim 11.

Claim 12

Claim 12 recites that determining object size comprises determining an object cross-sectional area and that the countermeasure is activated in response to the object cross-sectional area. Appellant respectfully submits that the *Lemelson* reference does not teach determining a cross-sectional area and activating a countermeasure in response to the cross-sectional area. Appellant therefore respectfully request the Board to reverse the Examiner's position with respect to claim 12.

Claim 13

Claim 13 recites that determining an object size comprises determining an object cross-sectional area and object height. As mentioned above in claims 11 and 12, determining an object height and object cross-sectional area is not taught or suggested in the *Lemelson* reference. Appellant therefore respectfully requests the Board to reverse the Examiner's position with respect to claim 13.

Claim 14

Claim 14 recites that determining an object cross-sectional area comprises determining the object cross-sectional area with a vision system. Although determining the width of an automobile is described in Col. 7 of the *Lemelson* reference, no cross-sectional area is determined with respect to the vision system. Appellant therefore respectfully requests the Board to reverse the Examiner's rejection of claim 14 as well.

Claim 15

Claim 15 depends upon claim 10 and recites detecting an object within the decision zone comprises detecting the object within the decision zone with a radar or lidar sensor system and confirming the presence with a vision system. As mentioned above in the arguments for claim 1 and 6, confirming the presence of an object with a vision system is not taught or suggested in the *Lemelson* reference. Appellant therefore requests the Board to reverse the Examiner's position with respect to claim 15.

Claim 16

Claim 16 recites that prior to the step of activating, the first countermeasure or the second countermeasure is chosen in response to object size. Appellant respectfully submits that no teaching or suggestion is provided for determining object size and determining the particular countermeasure in response to the object size. Therefore, Appellant respectfully requests the Board to reconsider the rejection of claim 16 as well.

The Rejection of Claim 4

Claim 4

Claim 4 stands rejected under 35 U.S.C. §103(a) as being unpatentable over *Lemelson* in view of *Kosiak* (5,835,007). Appellant respectfully submits that claim 4 is dependent on amended claim 1 and is therefore allowable. The *Kosiak* reference does not teach or suggest the limitations not suggested by the *Lemelson* reference. That is, the *Kosiak* reference also does not teach or suggest the use of a decision zone in combination with confirming the presence of an object within the decision zone. Appellant therefore respectfully requests the Board to reconsider the rejection of claim 4.

The Rejection of Claims 17 and 20

Claim 17

Claims 17 and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Lemelson* in view of *Farmer* (6,085,151). Appellant respectfully traverses.

Claims 17 and 20 are further limitations of claim 10. The *Farmer* reference does not teach or suggest a decision zone. The *Farmer* reference also does not teach or suggest varying a decision zone based upon the relative speed. Therefore, Appellant respectfully submits that claims 17 and 20 are allowable for the reasons set forth above.

It should be noted that claim 20 is dependent upon claim 19, which in turn is dependent upon claim18. Claim 20 specifically recites countermeasures that are performed in response to the object size and orientation. Appellant respectfully submits that the object orientation is not set forth in the *Lemelson* reference. Appellant therefore respectfully requests the Board to reconsider the Examiner's rejection with respect to claim 20 independently of claim 17.

VII. Appendix

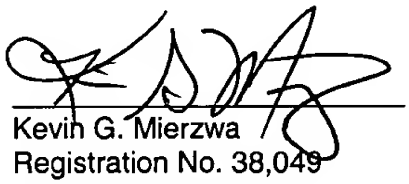
A copy of each of the claims involved in this appeal, namely claims 1-20 is attached hereto as Appendix A.

X. Conclusion

For the foregoing reasons, Appellant respectfully requests that the Board direct the Examiner in charge of this examination to withdraw the rejections.

Please charge any fees required in the filing of this appeal to deposit account 06-1510 or, if there are insufficient funds, to use deposit account 06-1505.

Respectfully submitted,



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APPENDIX

1. A pre-crash sensing system for an automotive vehicle coupled to a countermeasure system having at least a first countermeasure and a second countermeasure comprising:

a decision zone;

a radar or lidar unit generating an object distance signal and object relative velocity signal from an object within said decision zone;

a vision system generating an object size signal, said vision sensor confirming the presence of the object within the decision zone; and

a controller coupled to said radar unit or lidar unit and said vision system for activating either said first countermeasure or the first and the second countermeasures in response to said object distance, relative velocity and said object size.

2. A system as recited in claim 1 wherein said object size comprises height.

3. A system as recited in claim 1 wherein said object size comprises object area and object height.

4. A system as recited in claim 1 further comprising a vehicle speed sensor generating a speed signal corresponding to the longitudinal speed of the vehicle; wherein said controller activates said countermeasures in response to the longitudinal speed signal.

5. A system as recited in claim 1 further comprising wherein the decision zone; wherein said radar or lidar sensor generates an object distance and relative velocity signals from an object within said decision zone and said vision sensor confirms the presence of the object within the said decision zone has a size dependent on the relative velocity signal.

6. A pre-crash sensing system coupled to a countermeasure system having a first countermeasure and a second countermeasure, said pre-crash sensing system comprising:

a first sensor generating an object distance signal and relative velocity signal for an object present in a predefined decision zone;

a second sensor generating an object size signal, said second sensor confirming

the presence of the object within the said decision zone; and

a controller coupled to said first sensor and said second sensor for activating either said first countermeasure or said first and said second countermeasures in response to said object distance, said object relative velocity and said object size signals.

7. A system as recited in claim 6 wherein said object size comprises height.

8. A system as recited in claim 6 wherein said object size comprises object area and height

9. A system as recited in claim 6 wherein said controller classifies said object and determines an object orientation in response to said object distance, said object size and said object height.

10. A method for operating a pre-crash sensing system for an automotive vehicle having a countermeasure system, said method comprising:

establishing a decision zone relative to the vehicle;

detecting an object within the decision zone;

determining an object distance and relative velocity, said decision zone being a function of the relative velocity;

determining an object size; and

activating the countermeasure system in response to the object size and relative velocity.

11. A method as recited in claim 10 wherein determining object size comprises determining an object height; wherein activating the countermeasure system in response to the object size comprises activating the countermeasure system in response to the object height.

12. A method as recited in claim 10 wherein determining an object size comprises determining an object cross-sectional area; wherein activating the countermeasure system in response to the object size comprises activating the countermeasure system in response to the object cross-sectional area.

13. A method as recited in claim 10 wherein determining an object size comprises determining an object cross-sectional area and object height; wherein activating the countermeasure system in response to the object size comprises activating the countermeasure system in response to the object cross-sectional and object height.

14. A method in claim 13 wherein determining an object cross-sectional area comprises determining the object cross-sectional area with a vision system.

15. A method as recited in claim 10 wherein detecting an object within the decision zone comprises detecting the object within the decision zone with a radar or lidar sensor system and confirming the presence with a vision system.

16. A method as recited in claim 10 wherein prior to the step of activating, choosing either the first countermeasure or the first and the second countermeasure in response to said object size.

17. A method as recited in claim 10 wherein determining an object comprises determining the vehicle orientation; wherein activating the countermeasure system in response to the object size, comprises activating the countermeasure system in response to the object size and vehicle orientation.

18. A method as recited in claim 10 further comprising establishing a decision zone in front of the vehicle.

19. A method as recited in claim 18 further comprising detecting an object within the decision zone; and activating the countermeasure in response to detecting an object within the decision zone.

20. A method as recited in claim 19 wherein activating the countermeasure system comprises activating a first countermeasure comprising pre-arming airbags and pretensioning motorized belt pretensioners, or activating the above said first countermeasure and a second countermeasure comprising adjusting the host vehicle suspension height in response to object size and orientation.